WHAT IS CLAIMED IS:

1. A method of performing resource allocation and rate control of Dedicated Channels DCHs for non-realtime data services in a code division multiple access communication system, wherein said DCHs comprise uplink DCHs and downlink DCHs, and the resource and rate allocation of the uplink DCH is performed on the basis of that of the downlink DCH, the method being characterized by comprising the steps of:

a) determining channel states of the downlink DCHs for non-realtime data services, wherein said DCH channel states include: a blocked state, a macro-diversity state, an available state, an idle state and a frozen state;

b) determining states of users using said downlink DCHs, wherein said user states include: an occupying user, a common newly-added user, a handover newly-added user, an occupied user, a maintenance user or a macro-diversity user; and

c) correlating the channel states determined in step a) with the user states determined in step b), and dynamically allocating DCHs with certain rates to the users in the different user states according to a wireless measurement result measured by a current transmission channel, based on the priority and fairness requirements.

2. The method according to claim 1, characterized in that the respective DCH channel states in said step a) are determined as follows:

Blocked state: a downlink DCH occupancy timer is started immediately after a DCH is allocated, and when the timer indicates a time less than $T_{k,\min}^{DL}$, no matter how traffic, flow or channel utilization ratio and other wireless

measurements of the DCH changes, channel resources of the DCH are always blocked and cannot be occupied by other users; if a DCH is occupied for a time exceeding $T_{k,\min}^{DL}$ but within the maximum occupancy time $T_{k,\max}^{DL}$, and the traffic, or flow or channel utilization ratio and other wireless measurements of the DCH is higher than a lower limit M_{low}^{DL}, the channel resources will also be blocked; wherein $T_{k,\min}^{DL}$ is the minimum occupancy time of the *k*-th downlink DCH and $T_{k,\max}^{DL}$ is the maximum occupancy time of the *k*-th downlink DCH, where $T_{k,\max}^{DL} > T_{k,\min}^{DL}$; and *k* differentiates DCHs with different rates in an order from high to low;

Macro-diversity State: when a user of a DCH in the present cell enters a macro-diversity state of a soft handover or a softer handover, the DCH enters the macro-diversity state, and an occupancy timer of a downlink DCH of the DCH is reset and pauses counting, and the DCH in this state does not perform a rate control;

Available State: when a DCH is occupied for a time exceeding the maximum occupancy time $T_{k,\max}^{DL}$, no matter how the traffic, flow or channel utilization ratio or other wireless measurements of the DCH varies, the DCH is always in an available state, that is, it can be occupied by other users; in addition, if a DCH is occupied for a time exceeding $T_{k,\min}^{DL}$ but within the maximum occupancy time $T_{k,\max}^{DL}$, and the traffic, flow, or channel utilization ratio or other wireless measurements of the DCH is lower than the lower limit M_{low}^{DL}, the resources of this channel will also be in an available state;

Idle State: a DCH in an idle state is a DCH that is not used by any user in

a current DCH channel set for non-realtime services, which is generated for the following reasons: a DCH is newly added for the adjustment of the DCH channel set for non-realtime services; a non-realtime service user ends a conversation and releases a DCH occupied thereby; a non-realtime service user performs a handover to other channels and releases a DCH occupied thereby; or a non-realtime service user performs a handover to other cells and releases a DCH occupied thereby;

Frozen State: after receiving a downlink DCH resource re-allocation request, all the channels in a current downlink DCH resource pool are set in a frozen state; as for a DCH originally in a blocked state, its downlink DCH occupancy timer is paused, and all the operations of the DCH bandwidth allocation and rate control are also stopped, but the traffic, flow, or channel utilization ratio or other wireless measurements of the DCH are still performed; after the downlink DCH resource re-allocation is completed, the unchanged channels before and after the re-allocation are immediately restored into a state prior to the frozen state, and as for the changed DCHs, if a newly-assigned downlink DCH has a different rate from that of the original downlink DCH, a downlink DCH occupancy timer of the DCH is reset and the DCH enters a blocked state; otherwise, it enters the state prior to the frozen state, and the counting of the downlink DCH occupancy timer is resumed immediately after the DCH leaves the frozen state.

3. The method according to claim 1 or 2, characterized by further comprising the step of stipulating state transfer among the respective channel states, comprising:

the DCH newly-added for the re-allocation of the downlink DCH channel

set for non-realtime services entering an idle state, a DCH in a blocked state entering an idle state since a user thereof ends a conversation and releases the channel, a DCH in an available state entering an idle state since a user thereof ends a conversation or performs a handover to other channels and releases the occupied channel, and a DCH in a macro-diversity state entering an idle state since a user thereof performs a handover to other cells and releases the occupied channel;

DCHs in idle and available states entering a blocked state for being allocated to an occupying or newly-added user, and a DCH in a macro-diversity state entering a blocked state since its user quits the macro-diversity but still stays in the present cell;

a DCH in a blocked state entering an available state when the channel occupancy time exceeding $T_{k,\min}^{DL}$, and the traffic, flow or channel utilization ratio or other wireless measurements of the DCH is lower than the lower limit M_{low}^{DL}, or the channel occupancy time overruns, i.e., is greater than $T_{k,\max}^{DL}$;

DCHs in idle, available and blocked states may enter macro-diversity state due to the soft handover or softer handover; and

DCHs in idle, blocked, available and macro-diversity states entering and quitting a frozen state for the re-allocation of the downlink DCH channel resources for non-realtime services.

4. The method according to claim 1, characterized in that the respective user states in said step b) are determined as follows:

Occupying User: if a downlink DCH is occupied for a time exceeding $T_{k,\min}^{DL}$,while the traffic, flow or channel utilization ratio or other wireless

measurements of the downlink DCH exceeds the upper limit M_{high}^{DL}, a user of the downlink DCH is called an occupying user;

Common Newly-added User: a common newly-added user is a newly-added user since a non-realtime service user gets an initial access to a system or performs a handover from other channels to a DCH, the common newly-added user itself originally having no downlink DCH resources, and only a downlink DCH in an idle state being allowed to be allocated to a common newly-added user; and the original uplink and downlink DCH rates of the common newly-added user being marked as zero;

Handover Newly-added User: a handover newly-added user is a newly-added user due to a hard handover, a soft handover or a softer handover from other cells to the present cell, the handover newly-added user itself having no downlink DCH resources, downlink DCHs in idle and available states being allowed to be allocated to a handover newly-added user;

Occupied User: a user whose downlink DCH is in an available state is called an occupied user, wherein when the downlink DCH of the occupied user is occupied by an occupying user, the occupied user immediately occupies the original downlink DCH of the occupying user, that is, the occupying user and the occupied user adopt a channel permutation mode for a direct rate switching therebetween;

Maintenance User : a maintenance user is a user whose downlink DCH is in a blocked state, wherein the maintenance user does not occupy downlink DCH channel resources of other users, and meanwhile, the downlink DCH channel resources of the maintenance user cannot be occupied by other users either;

Macro-diversity User: a macro-diversity user is a user whose downlink DCH is in a macro-diversity state, wherein the macro-diversity user does not occupy downlink DCH resources of other users, and meanwhile, the downlink DCH resources of the macro-diversity user cannot be occupied by other users either.

5. The method according to claim 1, characterized by further comprising:

the step of determining a current downlink DCH available channel set for non-realtime data services on the basis of i) realtime and non-realtime service active users of DCHs in a current cell and downlink load change information, ii) allocation of power and orthogonal variable spreading factor channel codes, or iii) information relating to a handover between a common channel and a dedicated channel, user's initial access and release, and handover user's access and release, wherein the number of DCHs in said DCH available channel set is greater than or equal to the current number of active users for the non-realtime services.

6. The method according to claim 5, characterized in that the step of determining the current downlink DCH available channel set for non-realtime data services further comprises:

i) setting in a frozen state the DCHs in said downlink DCH available channel set for non-realtime data services, based on downlink DCH channel resource re-allocation request message;

ii) re-allocating a downlink DCH channel set for non-realtime data services based on a response to said request message, wherein the re-allocation can change the rates of DCHs in idle, available and blocked states, and a DCH in a macro-diversity state allows the re-allocation but its rate

cannot be changed; in addition, if the re-allocation changes the DCHs originally in the available, blocked and macro-diversity states, users of these channels will be re-allocated a downlink DCH; and

iii) updating the downlink DCH available channel set and assigning a new downlink DCH to said uses in step ii), wherein if the newly-assigned downlink DCH has a rate different from that of the original downlink DCH, the downlink DCH occupancy timer of the DCH is reset and the DCH enters a blocked state, and otherwise, it returns to a state prior to a frozen state.

7. The method according to claim 5, characterized in that the step of determining the current downlink DCH available channel set for non-realtime data services further comprises:

when a new non-realtime service user gets an initial access to a system or performs a handover from other cells to the present cell, or performs a handover from other channels to said downlink DCH, the step of allocating a DCH to the newly-added user in said downlink DCH based on the type and rate requirement information of the newly-added user; and

the step of releasing the DCH occupied by a non-realtime service user when said user ends a conversation, performs a handover out of the present cell or from the DCH to other channels.

8. The method according to claim 1, characterized in that said step c) further comprises: based on downlink loss levels, allocating DCH channel resource allocation queues with different priority levels to users of the different downlink loss levels.

9. The method according to claim 8, characterized by:

allocating to a handover user a downlink DCH channel resource

allocation queue with a first priority, said allocation queue with the first priority being formed of a single queue;

allocating to a common newly-added user and an occupying user downlink DCH channel resource allocation queues with a second priority, said allocation queue with the second priority being formed of a plurality of queues with different priorities; and

wherein, said allocation queue with the first priority has a higher priority than said allocation queue with the second priority and is allocated in preference a high-rate DCH.

10. The method according to claim 8 or 9, characterized by classifying downlink losses in a cell into different levels in accordance with cell coverage and other configuration parameters determined in the cell wireless planning, and in that if the downlink loss which the downlink loss level of a user corresponds to is smaller, the user enters a downlink DCH resource allocation queue with a high priority when requiring the allocation of a DCH.

11. The method according to claim 10, characterized by obtaining the downlink loss through one of the following methods: i) a user equipment directly providing a measurement value of the downlink loss; or ii) obtaining the downlink loss by calculating a difference between a known transmitting power of a common pilot channel and a receiving signal channel power of said common pilot channel provided by the user equipment.

12. The method according to claim 1, characterized in that said step c) further comprises dynamically allocating a DCH with a certain rate to a soft-handover newly-added user through the following sub-steps, said sub-steps comprising:

i) arranging said soft-handover newly-added user in the downlink DCH resource allocation queue with the first priority;

ii) setting an initial downlink DCH rate of said soft-handover newly-added user to be the same as downlink DCH rates of other wireless links in an active set of said user, and carrying out an uplink and downlink access control discrimination;

iii) searching for a downlink DCH for said downlink rate from downlink DCHs in an idle state, and allocating the downlink DCH in the idle state to said soft-handover newly-added user;

iv) searching for a downlink DCH for said downlink rate from downlink DCHs in an available state, and allocating the downlink DCH in the available state to said soft-handover newly-added user;

v) based on the downlink DCH allocated to said soft-handover newly-added user, allocating an uplink DCH with a corresponding rate to said user; and

vi) canceling said soft-handover newly-added user from the allocation queue with the first priority.

13. The method according to claim 12, characterized in that,

if the access discrimination in step ii) fails, a response message is sent to indicate that the reason for the failure lies in an uplink and/or downlink access control failure, and meanwhile, the allocation is ended and said soft-handover newly-added user is canceled from the allocation queue with the first priority.

14. The method according to claim 12, characterized in that,

if the downlink DCH for said downlink rate fails to be found from the

downlink DCHs in the available state in step iv), a response message is returned to indicate that there is no downlink DCH with a match rate, and meanwhile, the allocation is ended and said soft-handover newly-added user is canceled from the allocation queue with the first priority.

15. The method according to claim 12, characterized in that,

if the downlink DCH for said downlink rate is found from the downlink DCHs in the available state in step iv), a further determination is performed to determine whether a downlink DCH of an occupied user is allowed to be occupied;

if allowed to be occupied, the downlink DCH in the available state is allocated to said soft-handover newly-added user, and hence, the occupied user is re-allocated a downlink DCH with a rate closest to and smaller than its original downlink rate from downlink DCH resources in an idle state;

otherwise, return to step iv), and search for a downlink DCH for said downlink rate from downlink DCHs in an available state for said soft-handover newly-added user.

16. The method according to claim 1, characterized in that said step c) further comprises dynamically allocating a DCH with a certain rate to a hard-handover newly-added user through the following sub-steps, said sub-steps comprising:

i) arranging said hard-handover newly-added user in the downlink DCH resource allocation queue with the first priority;

ii) setting a downlink DCH rate of said hard-handover newly-added user to be the same as its original downlink DCH rate, and carrying out a downlink access control discrimination;

iii) determining whether a value allowed by the uplink access control and being equal to or smaller than an original uplink DCH rate of the hard-handover newly-added user can be found in an uplink DCH rate value domain corresponding to a downlink DCH with the downlink DCH rate;

iv) searching for a downlink DCH for said downlink rate from downlink DCHs in an idle state, and allocating the downlink DCH in the idle state to said hard-handover newly-added user;

v) searching for a downlink DCH for said downlink rate from downlink DCHs in an available state, and allocating the downlink DCH in the available state to said hard-handover newly-added user;

vi) based on the downlink DCH allocated to said soft-handover newly-added user, allocating an uplink DCH with a corresponding rate to said user; and

vii) canceling said hard-handover newly-added user from the allocation queue with the first priority.

17. The method according to claim 16, characterized by:

if the access discrimination fails in step ii), taking a next smaller downlink DCH rate to undergo a downlink access control discrimination again; and

if there is no smaller rate for the access control discrimination, sending a response message to indicate the reason for the failure lies in an unlink and/or downlink access control failure, and at the same time, ending the allocation and canceling said hard-handover newly-added user from the allocation queue with the first priority.

18. The method according to claim 16, characterized by:

if the value allowed by the uplink access control and being equal to or

smaller than the original uplink DCH rate of the hard-handover newly-added user fails to be found in the uplink DCH rate value domain corresponding to a downlink DCH with the downlink DCH rate in step iii), taking a next smaller downlink DCH rate to repeat the determination in step iii); and

if there is no smaller rate for the determination in step iii), sending a response message to indicate the reason for the failure lies in an unlink and/or downlink access control failure, and meanwhile, ending the allocation and canceling said hard-handover newly-added user from the allocation queue with the first priority.

19. The method according to claim 16, characterized by:

if the downlink DCH for said downlink rate fails to be found from the downlink DCHs in the available state in step v), taking a smaller downlink DCH rate, returning step iv) and searching again a downlink DCH for the smaller downlink rate from downlink DCHs in an idle state.

20. The method according to claim 16, characterized in that,

if the downlink DCH for said downlink rate is found in the downlink DCHs in an available state in step iv), a further determination is performed to determine whether a downlink DCH of an occupied user allows to be occupied;

if allows to be occupied, the downlink DCH in the available state is allocated to said hard-handover newly-added user, and hence the occupied user is re-allocated a downlink DCH with a rate closest to and smaller than its original downlink rate from the downlink DCH channel resources in the idle state;

otherwise, a downlink DCH for said downlink rate is re-searched for from the downlink DCHs in the available state for said hard-handover newly-added

user.

21. The method according to claim 1, characterized in that said step c) further comprises dynamically allocating a DCH with a certain rate to a common newly-added user through the following sub-steps, said sub-steps comprising:

i) arranging said common newly-added user in the downlink DCH resource allocation queue with a second priority;

ii) determining whether there exists a downlink DCH in an idle state and allowed by the access control, and allocating the downlink DCH to said common newly-added user;

iii) determining whether there is an uplink rate allowed by the uplink access control within a value domain range of an uplink DCH rate corresponding to said downlink DCH rate, and allocating the maximum of the uplink DCH rate allowed by the uplink access control to said common newly-added user; and

iv) canceling said common newly-added user from the allocation queue with the second priority.

22. The method according to claim 21, characterized by

if the downlink DCH allowed to be accessed fails to be found in the channels in an idle state in step ii), placing said common newly-added user at the end of a queue thereof to wait for re-allocation.

23. The method according to claim 21, characterized by

if an uplink rate allowed by the uplink access control fails to be found within the value domain range of the uplink DCH rate corresponding to said downlink DCH rate in step iii), marking the downlink DCH rate, and placing

said common newly-added user at the end of the queue thereof to wait for re-allocation.

24. The method according to claim 1, characterized in that said step c) further comprises dynamically allocating a DCH with a certain rate to an occupying user through the following sub-steps, said sub-steps comprising:

i) arranging said occupying user in the downlink DCH resource allocation queue with the second priority;

ii) determining whether there exists a downlink DCH in an idle state allowed by the downlink access control and having a rate higher than an original downlink rate of said occupying user, and allocating the high-rate downlink DCH to said occupying user;

iii) determining whether there exists a downlink DCH in an available state allowed by the downlink access control and having a rate higher than the original downlink rate of said occupying user, and allocating the high-rate downlink DCH to said occupying user;

iv) determining whether the value domain range of the uplink DCH rate corresponding to a rate of the high-rate downlink DCH contains an original uplink DCH rate of said occupying user, and setting the uplink DCH rate of said occupying user as its uplink rate; and

v) canceling said occupying user from the allocation queue with the second priority.

25. The method according to claim 24, characterized by

if a downlink DCH in an available state allowed to be accessed by the uplink access control and having a rate higher than the original downlink rate of said occupying user does not exist in step iii), placing said occupying user at

the end of the queue thereof to wait for re-allocation.

26. The method according to claim 24, characterized in that

if it is determined that there exists the downlink DCH in an available state allowed by the downlink access control and having a rate higher than the original downlink rate of said occupying user in step iii), a further determination is performed to determine whether a downlink DCH of an occupied user allows to be occupied;

if allows to be occupied, performing the determination in step iv);

otherwise, placing said occupying user at the end of the queue thereof to wait for re-allocation.

27. The method according to claim 24, characterized in that

if it is determined that the value domain range of the uplink DCH rate corresponding to the rate of the high-rate downlink DCH does not contain the original uplink DCH rate of said occupying user, a further determination is performed to determine whether there is a rate allowed by the uplink access control within said value domain range of the uplink DCH rate; and

if there is, the uplink rate allowed by the uplink access control within said value domain range of the uplink DCH rate and being closest to the original uplink DCH rate of the occupying user is allocated to said occupying user;

otherwise, the current downlink DCH rate is marked and said occupying user is placed at the end of the queue thereof to wait for re-allocation.

28. The method according to claim 24, characterized in that

when the occupying user employs a DCH in an idle state, its original downlink DCH is released as an idle channel; and

when the occupying user employs a DCH in an available state, its original

downlink DCH is allocated to the occupied user.

29. The method according to claim 9, 21 or 24, characterized in that said DCH resource allocation queue with the second priority adopts a weighed Round-Robin allocation scheme for allocation.

30. The method according to claim 1, characterized by further comprising:

the step of starting a timer for timing downlink DCH occupancy after a DCH is allocated, and

the step of determining a state of said DCH by comparing said timer with the predetermined downlink DCH maximum occupancy time $T_{k,\max}^{DL}$ and minimum occupancy time $T_{k,\min}^{DL}$, in combination with the comparison between wireless measurements of said DCH and the lower limit M_{low}^{UL} of the wireless measurements.

31. The method according to claim 30, characterized by adaptively increasing $T_{k,\min}^{DL}$ of a low-rate channel and/or decreasing $T_{k,\max}^{DL}$ of a high-rate channel, when the length of a downlink DCH resource allocation queue exceeds a predetermined threshold.

32. The method according to claim 1, characterized in that a result of said wireless measurements comprises a traffic measurement result, a flow measurement result of a transmission channel or a channel utilization ratio measurement result.

33. The method according to claim 1, characterized in that said code division multiple access communication system is a wide code division multiple access communication system.